MacDIARMID, Alan G.

(1927- ), New Zealand-born American chemist and Nobel laureate, known for his contribution to the discovery of conducting polymers, commonly called "synthetic metals," and especially to the development of polyaniline, now one of the most technologically important conducting polymers. Born on April 14, 1927, in Masterton, he was educated at the University of New Zealand. He earned his first Ph.D. in the U.S. at the University of Wisconsin at Madison in 1953 and a second Ph.D. at Cambridge University, England, in 1955. MacDiarmid joined the faculty of the University of Pennsylvania in 1955, becoming a full professor there in 1964 and a Blanchard Professor of Chemistry in 1988.In 1973 he worked with the American physicist Alan Heeger, a colleague at Pennsylvania, on a new form of sulfur nitride, a metallic-looking film. MacDiarmid discussed this unusual polymeric material with the Japanese chemist Hideki Shirakawa at a conference in 1975, after Shirakawa mentioned a similar product he had obtained in 1974 in an experiment in which too much catalyst was added erroneously to polyacetylene. The ensuing research by MacDiarmid, Shirakawa (whom MacDiarmid invited to Pennsylvania in 1975) and Heeger resulted in the discovery of the first conducting polymer in 1977. The new material, which was obtained by oxidizing polyacetylene with IODINE, (q.v.) vapor, exhibited a conductivity nearly as high as that of such metals as COPPER, and SILVER, (qq.v.). Their experiment demonstrated for the first time that by varying the quantities of the added impurity element--the so-called doping agent (either a catalyst or, as in this case, iodine vapor)--the ability of polyacetylene to conduct electricity (or to insulate from electricity) can be increased or decreased. PLASTICS, (q.v.)--primarily insulators--can therefore be made to behave like metallic conductors and semiconductors as well. The new material made possible the manufacturing of plastic batteries in 1979, a breakthrough in the technology of storage electricity. Other practical applications include anti-static protective shields on photographic film, shields against magnetic radiation on computer screens, and electroluminescent polymer displays.During the 1980s and 1990s MacDiarmid has been involved in research into ways to enhance the mechanical properties of polyaniline, which, unlike polyacetylene, is stable in both air and water. Polyaniline was patented for use in rechargeable batteries in 1984-85 (commercially available in 1987). MacDiarmid, Heeger, and Shirakawa were awarded the 2000 Nobel Prize in chemistry for "the discovery and development of conductive polymers."

**Citation (MLA)**

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